

Name _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Insurance companies track life expectancy information to assist in determining the cost of life insurance policies. The insurance company knows that, last year, the life expectancy of its policyholders was 77 years. They want to know if their clients this year have a longer life expectancy, on average, so the company randomly samples some of the recently paid policies to see if the mean life expectancy of policyholders has increased. The insurance company will only change their premium structure if there is evidence that people who buy their policies are living longer than before.

86	75	83	84	81	77	78	79	79	81
76	85	70	76	79	81	73	74	72	83

- 1) For more accurate cost determination, the insurance companies want to estimate the life expectancy to within one year with 95% confidence. How many randomly selected records would they need to have? 1) _____

Textbook authors must be careful that the reading level of their book is appropriate for the target audience. Some methods of assessing reading level require estimating the average word length. We've randomly chosen 20 words from a randomly selected page in *Stats: Modeling the World* and counted the number of letters in each word:

5, 5, 2, 11, 1, 5, 3, 8, 5, 4, 7, 2, 9, 4, 8, 10, 4, 5, 6, 6

- 2) Suppose that our editor was hoping that the book would have a mean word length of 6.5 letters. Does this sample indicate that the authors failed to meet this goal? Test an appropriate hypothesis and state your conclusion. 2) _____

A professor at a large university believes that students take an average of 15 credit hours per term. A random sample of 24 students in her class of 250 students reported the following number of credit hours that they were taking:

12	13	14	14	15	15	15	16	16	16	16	16
17	17	17	18	18	18	18	19	19	19	20	21

- 3) Find a 95% confidence interval for the number of credit hours taken by the students in the professor's class. Interpret your interval. 3) _____

The average American sees 3.9 movies at the theater each year. A curious student polls 30 friends and family over the course of a week. He finds that his friends have seen an average of 4.5 movies with a standard deviation of 1.2 movies.

- 4) The student insists to his media teacher at school that movie attendance is on the rise. Do you agree with this conclusion? 4) _____
- 5) Does this sample provide evidence that people are attending the movies more often? Provide a complete significance test to support your answer. 5) _____

A total of 23 Gossett High School students were admitted to State University. Of those students, 7 were offered athletic scholarships. The school's guidance counselor looked at their composite ACT scores (shown in the table), wondering if State U. might admit people with lower scores if they also were athletes. Assuming that this group of students is representative of students throughout the state, what do you think?

Composite ACT Score		
Non-athletes		Athletes
25	21	22
22	27	21
19	29	24
25	26	27
24	30	19
25	27	23
24	26	17
23	23	

6) Create and interpret a 90% confidence interval.

6) _____

A teacher wants to see if two different forms of an exam are equivalent or if one of the exams is more difficult than the other. She has 120 students, which she randomly sorts into two groups of 60. The group that takes exam A has a mean score of 78.1% with a standard deviation of 5.6%. Exam B scores an average of 74.8% with a standard deviation of 8.7%.

7) Find and interpret a 95% confidence interval. Also explain how the values of your confidence interval correspond with your conclusion on #1.

7) _____

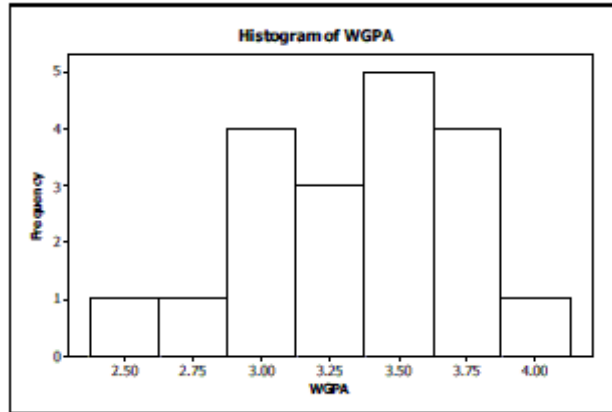
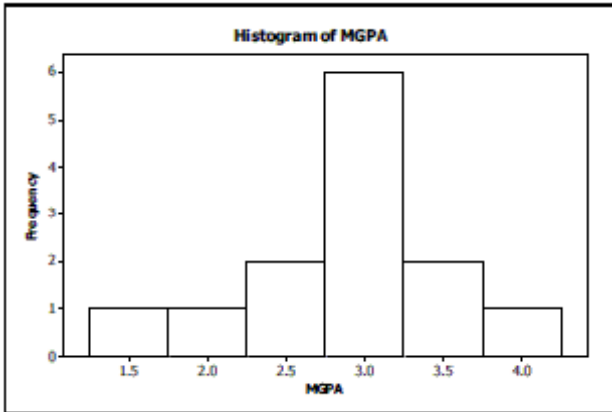
Every year favorite songs compete to be on a Top 200 list based upon sales and rankings by the experts in the music industry. These songs have many characteristics, such as song length and beats per minute, which vary from category to category in the music industry. A disc jockey wondered if the number of beats per minute in songs classified as dance music were lower than the beats per minute in the songs that are ranked on a Top 200 list from 2001. A random sample of songs from each group was selected and the beats per minute are listed in the chart at the right. Does this sample indicate that songs classified as dance music have lower beats per minute than the songs ranked on a Top 200 list?

Beats per Minute			
Dance Songs		Top 200 Songs	
121	119	122	120
122	121	121	118
117	122	121	121
120	119	122	123
120	119	121	118
121	118	119	120
118	120	120	124
120	123	119	
117	118		

8) Create and interpret a 90% confidence interval.

8) _____

A random sample of 13 men and 19 women in a college class reported their grade point averages (GPAs). Here are histograms from the data:



Summary statistics for these data are:

	\bar{y}	s
Men	2.898	0.583
Women	3.330	0.395

9) Create and interpret a 95% confidence interval.

9) _____

10) A woman in the class says that she believes that college women tend to have higher GPAs than do college men. Does this sample support her claim? Test an appropriate hypothesis and state your conclusion.

10) _____

Most people are definitely dominant on one side of their body - either right or left. For some sports being able to use both sides is an advantage, such as batting in baseball or softball. In order to determine if there is a difference in strength between the dominant and non-dominant sides, a few switch-hitting members of some school baseball and softball teams were asked to hit from both sides of the plate during batting practice. The longest hit (in feet) from each side was recorded for each player. The data are shown in the table below. Does this sample indicate that there is a difference in the distance a ball is hit by batters who are switch-hitters?

Batter	Dominant Side	Non-dominant Side
1	142	119
2	144	118
3	153	126
4	148	119
5	146	121
6	149	125
7	138	116
8	145	120
9	153	124
10	160	138
11	163	135
12	170	144
13	169	142
14	151	128
15	152	131
16	167	141
17	164	140
18	165	140
19	163	138

11) Test an appropriate hypothesis and state your conclusion.

11) _____

Before you took this course, you probably heard many stories about Statistics courses. Oftentimes parents of students have had bad experiences with Statistics courses and pass on their anxieties to their children. To test whether actually taking AP* Statistics decreases students' anxieties about statistics, an AP* statistics instructor gave a test to rate student anxiety at the beginning and end of his course. Anxiety levels were measured on a scale of 0-10. Here are the data for 16 randomly chosen students from a class of 180 students:

Pre-course anxiety level	7	6	9	5	6	7	5	7	6	4	3	2	1	3	4	2
Post-course anxiety level	4	3	7	3	4	5	4	6	5	3	2	2	1	3	4	3
Difference (Post – Pre)	-3	-3	-2	-2	-2	-2	-1	-1	-1	-1	-1	0	0	0	0	1

12) Create and interpret a 90% confidence interval.

12) _____

One common method of evaluating the performance of a mutual fund is to compare its returns to those of a recognized benchmark such as an index of the returns on all securities of the type that the fund accumulates. The Janus Worldwide Fund considers its benchmark to be the MSCI World IndexSM. The table below depicts the annual returns (percent) for a recent ten-year period. Is this fund a good investment? That is, does this fund significantly outperform its benchmark?

Year	Janus Worldwide	MSCI Index
2003	24.23	33.11
2004	5.53	14.72
2005	5.76	9.49
2006	17.84	20.07
2007	9.18	9.04
2008	-45.04	-40.71
2009	37.49	29.99
2010	17.00	11.76
2011	-13.95	-5.54
2012	19.64	15.83

Source:

[https://www3.janus.com/advisor/Documents/Advisor%20Lit%20System/Fact%20Sheets/4Q12%20Fact%20Sheet%20\(Janus%20Worldwide%20Fund-Class%20A\)_exp%2004-15-13.pdf](https://www3.janus.com/advisor/Documents/Advisor%20Lit%20System/Fact%20Sheets/4Q12%20Fact%20Sheet%20(Janus%20Worldwide%20Fund-Class%20A)_exp%2004-15-13.pdf)

- 13) Explain clearly whether this data should be analyzed using a 2-sample t test approach or a match pairs t -test method. 13) _____

- 14) A soft drink company is conducting research to select a new design for the can. A random sample of participants has been selected. Instead of a typical taste test with two different sodas, they actually give each participant the same soda twice. One drink is served in a predominantly red can, the other in a predominantly blue can. The order is chosen randomly. Participants are asked to rate each drink on a scale of 1 to 10. Thus, the company wishes to test if the color of the can influences the rating. The ratings were recorded for each participant. The data are shown in the table below. Does this sample indicate that there is a difference in the ratings? Test an appropriate hypothesis and state your conclusion.

14) _____

Rater	Red	Blue
1	4	6
2	7	5
3	3	6
4	8	9
5	5	2
6	9	9
7	7	10
8	5	4
9	6	8
10	9	7
11	8	8
12	3	7
13	6	5
14	8	8
15	9	10
16	7	6

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- 15) Carry out the appropriate test and state your conclusion in context. 15) _____
- 16) Housing costs A government report on housing costs says that single-family home prices nationwide are skewed to the right, with a mean of \$235,700. 16) _____
- We collect price data from a random sample of 50 homes in Orange County, California. Why is it okay to use these data for inference even though the population is skewed?
 - The standard deviation of the 50 homes in our sample was \$25,500. Specify the sampling model (shape, center, spread) for the mean price of such samples.
 - This sample of randomly chosen homes produced a 90% confidence interval for the mean price in Orange County of (\$233,954, \$246,046). Does this interval provide evidence that single-family home prices are unusually high in this county? Explain briefly.
 - Suppose we hope to improve our estimate by choosing a new sample. How many home prices must we survey to have 90% confidence of estimating the mean local price to within \$2000?

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 17) At one vehicle inspection station, 13 of 52 trucks and 11 of 88 cars failed the emissions test. Assuming these vehicles were representative of the cars and trucks in that area, what is the standard error of the difference in the percentages of all cars and trucks that are not in compliance with air quality regulations? 17) _____
- A) 0.032 B) 0.025 C) 0.049 D) 0.095 E) 0.070

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- 18) Vacation days The distribution of the number of vacation days per year offered by different U.S. companies is skewed to the right. 18) _____

- a. We collect data on the number of vacation days from a random sample of 60 companies across the United States. Why is it okay to use these data for inference even though the population is skewed?
- b. The mean and standard deviation of the 60 companies in our sample were 22 days and 9 days, respectively. Specify the sampling model (shape, center, spread) for the mean number of vacation days of such samples.
- c. Find a 95% confidence interval for the mean number of vacation days offered by U.S. companies.
- d. Explain what "95% confidence" means in this context.

- 19) Too much TV? A father is concerned that his teenage son is watching too much television each day, since his son watches an average of 2 hours per day. His son says that his TV habits are no different than those of his friends. Since this father has taken a stats class, he knows that he can actually test to see whether or not his son is watching more TV than his peers. The father collects a random sample of television watching times from boys at his son's high school and gets the following data: 19) _____

1.9 2.3 2.2 1.9 1.6 2.6 1.4 2.0 2.0 2.2

Is the father right? That is, is there evidence that other boys average less than 2 hours of television per day? Conduct a hypothesis test, making sure to state your conclusions in the context of the problem.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 20) A researcher found that a 98% confidence interval for the mean hours per week spent studying by college students was (13, 17). Which is true? 20) _____

- I. There is a 98% chance that the mean hours per week spent studying by college students is between 13 and 17 hours.
 - II. 98% of college students study between 13 and 17 hours a week.
 - III. Students average between 13 and 17 hours per week studying on 98% of the weeks.
- A) I only B) none C) II only D) I and III E) III only